

Growth Factor–Mediated Treatment of Recession Defects: A Randomized Controlled Trial and Histologic and Microcomputed Tomography Examination

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Background: The primary aims of this two-part prospective study were: 1) to compare the safety and efficacy of beta-tricalcium phosphate (β -TCP) + 0.3 mg/ml recombinant human platelet-derived growth factor-BB (rhPDGF-BB) with a bioabsorbable collagen wound-healing dressing and a coronally advanced flap (CAF) to a subepithelial connective tissue graft (CTG) in combination with a CAF in subjects with gingival recession defects using a randomized, controlled, split-mouth design; and 2) to compare, through histologic and microcomputed tomography (micro-CT) examination, the periodontal regenerative potential of these two therapies in surgically created gingival recession defects in restoring missing cementum, periodontal ligament (PDL), and supporting alveolar bone.

Methods: In the randomized controlled trial (RCT), 30 patients with Miller Class II buccal gingival recession, ≥ 3 mm deep and ≥ 3 mm wide in contralateral quadrants of the same jaw were treated and followed for 6 months. Using a split-mouth design with similar bilateral recession defects, test sites were treated with 0.3 mg/ml rhPDGF-BB + β -TCP + bioabsorbable collagen wound-healing dressing; contralateral control sites were treated with a CTG, each in combination with a CAF. In the histologic/micro-CT study segment, recession defects were created in six teeth, each requiring extraction for orthodontic therapy. These defects were created with a recession depth ≥ 3 mm, the osseous crest 2 to 3 mm apical to the gingival margin, and with 2 to 3 mm of keratinized tissue. The defects were treated with a CTG (control) or rhPDGF-BB + β -TCP + wound-healing dressing (test), plus CAF. Nine months after surgical correction, en bloc resections were obtained and examined histologically and with micro-CT.

Results: In the RCT, test and control treatments demonstrated clinically significant improvements from baseline through month 6. Statistically significant results favoring the CTG were found in recession depth reduction (-2.9 ± 0.5 mm, test; -3.3 ± 0.6 mm, control; $P = 0.009$), root coverage (90.8%, test; 98.6%, control; $P = 0.013$), and -3.9 ± 0.7 mm, control, -3.3 ± 1.3 mm, test, recession width reduction ($P = 0.035$), whereas mid-buccal probing depth (PD) and PD reduction (PDR) reduction favored the test group (1.4 ± 0.4 mm, test; 1.8 ± 0.1 mm, control; $P < 0.001$ PD and -0.0 mm test; $+0.4$ mm control PDR). For all other parameters, the two treatments were statistically equivalent, including increases in keratinized tissue, esthetic results, and subject satisfaction. In the histologic/micro-CT portion, all four sites treated with rhPDGF-BB + β -TCP showed evidence of regeneration of cementum, PDL with inserting connective tissue fibers, and supporting alveolar bone, whereas neither CTG-treated site exhibited any signs of periodontal regeneration.

Conclusions: CTG and rhPDGF-BB + β -TCP + wound-healing dressing are effective treatment modalities for clinically correcting gingival recession defects. In addition, the current study demonstrated that regeneration of the periodontium in gingival recession defects was possible through a growth factor–mediated approach. *J Periodontol* 2009;80:550-564.

KEY WORDS

Connective tissue; gingival recession/surgery; grafts; histology; recombinant platelet-derived growth factor-BB; rhPDGF-BB.

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